Battery Pack and Charger User Guide

JUNE 2024

MN010354A01-AA

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Document History

Version	Description	Date
MN010354A01-AA	Initial converted edition.	June 2024

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About This Manual

This Manual provides detailed operating procedures for Battery Pack and Battery Charger products. This Manual is not intended to cover the operation details of the Repeater or the Mobile Radio.

For operating instructions and programming details, refer to the *Vehicular Repeater Programming Guide* or *PDR8000 Programming Guide*.

For details on the APX series Mobile or Portable Radios operation, refer to the applicable Manuals available from Motorola Solutions Learning eXperience Portal (LXP) website.

Terms Used in This Manual

Terms	Description
Transportable Repeater System (TRS)	Includes the Mobile Radio, Control Head and its accessories, or PDR8000 with optional Booster pack.
Transportable Repeater	Describes the Transportable Repeater that uses a 13.8 V DC power supply.

Notations Used in This Manual

This guide is designed to give you more visual cues.

The following graphic icons are used throughout the user guide.

DANGER: The signal word DANGER with the associated safety icon implies information that, if disregarded, will result in death or serious injury.

WARNING: The signal word WARNING with the associated safety icon implies information that, if disregarded, could result in death or serious injury, or serious product damage.

CAUTION: The signal word CAUTION with the associated safety icon implies information that, if disregarded, may result in minor or moderate injury, or serious product damage.

CAUTION: The signal word CAUTION without the associated safety icon implies potential damage to non-MSI equipment, software or data, or injury that is not related to the MSI product.

IMPORTANT: IMPORTANT statements contain information that is crucial to the discussion at hand, but is not a CAUTION or WARNING. There is no warning level associated with the IMPORTANT statement.

NOTE: NOTE contains information more important than the surrounding text, such as exceptions or preconditions. They also refer the reader elsewhere for additional information, remind the reader how to complete an action (when it is not part of the current procedure, for instance), or tell the reader where something is on the screen. There is no warning level associated with a notice.

TIP: TIP contains information that provides the reader a different or quicker method in accomplishing the same task. At times, they also give the reader the best way to proceed or handle the task.

The following special notations highlight certain information:

Table 1: Special Notations

Example	Description
Menu key or **PTT** button	Bold words indicate a name of a key, button, soft menu item, or programming menu item.

Example	Description
Ordering Guide	Italic word indicates title of a bibliographic resource.
`Powering Off`	Typewriter words indicate the Human Machine Interface (HMI) strings or messages displayed on your display.
File → **Templates (DCD Files)** → **Load DCD Template**	Bold words with the arrow between indicate the navigation structure in the menu items.

Safety Information

DANGER: There are NO user serviceable parts inside the Battery Pack or the FutureCharge Battery Charger. DO NOT OPEN THE BATTERY PACK AND THE CHARGER AS LETHAL VOLTAGES ARE PRESENT INSIDE! Only Motorola Solutions can service the Battery Pack and the charger.

WARNING:

- To ensure that Radio Frequency (RF) energy exposure to bystanders external to a repeater or mobile radio is lower than the recommended safety standards, transmit with any repeater or mobile radio only when bystanders are at least 2 meters away from a properly installed externally mounted antenna for radios with less than 50 Watts output power, or 3 meters away for radios with 50 Watts or greater power output. Refer to the *RF Safety Booklets* for exact distances.
- Never use the Battery Pack or attempt to charge the Battery Pack if it is damaged in any manner. If it is damaged, contact Motorola Solutions.
  - Only use chargers provided for the Battery Pack. Use of any other charger could damage the Battery Pack or result in fire, electric shock, or electrocution.
  - DO NOT store or charge the Battery Packs in locations with a warm environment.
  - Keep the Battery Pack dry.
  - DO NOT incinerate the Battery Packs.
- DO NOT enclose the Battery Pack in an airtight casing or environment. During charging and discharging the Battery Packs must have ventilation. Airtight environment could cause an explosion.
- DO NOT operate the Battery Packs in explosive atmospheres, for example, in the presence of flammable liquids, gases, dust or in an area where the Battery Pack could be exposed to sparks or any burning material.
  - Before disposing the Battery Pack, check with your State/Province Environmental Protection Agency.
  - If the Battery Pack should ever become warm when charging or if it should emit a pungent odor, disconnect the charger from an AC outlet immediately and contact Motorola Solutions.
- Do not operate a charger with damaged AC power cords or DC output cords or accessories. Call the manufacturer to have the charger replaced immediately.
  - NEVER charge a frozen Battery Pack.
  - Locate the charger as far away from the Battery Pack as is allowed by the length of the output cable harness.
  - NEVER set the charger on a surface constructed from combustible material.
  - The charger body and power cord are waterproof. However, do not expose the AC and DC electrical connections at the ends of the power cords to rain or snow.
  - When handling electric power cords, always pull by the plug rather than by the cord. This will reduce the risk of damage to both the plug and the cord, and it will minimize the likelihood of electric shock resulting from that damage.
  - Make sure that all electric power cords are located so that they cannot be stepped on, tripped over, or otherwise subjected to damage or stress.
  - When leaving a battery charger connected to the Battery Pack for extended periods of time (weeks, months, and so forth), periodically check the battery to see if it is unusually warm, if it is releasing an excessive amount of gas, or if it is emitting an unpleasant odor. If any of these things occur, disconnect the charger from the AC electrical outlet and contact the manufacturer immediately.

- NEVER smoke or allow a source of electric spark or open flame in the vicinity of the battery or charger.

IMPORTANT: Before each use and charging of the Battery Pack, check the ventilation holes provided on the Battery Pack to ensure that the holes have not been blocked or obstructed. Clean or clear any obstruction such as dirt that may obstruct ventilation.

Chapter 1

Battery Pack Overview

This section provides an overview and description of the Battery Pack and its components.

1.1

Principle of Operation

The Suitcase can contain either a DVRS, a PDR8000, or a Booster Pack. The Suitcase contains an internal 120 VAC or 220 VAC to 13.8 VDC power supply.

NOTE: DVRS comes from the factory with only one of 120 V or 220 V while the PDR8000 and the Booster Pack are compatible with both. The Battery Pack is used to supply nominal 13.8 VDC power to the Suitcase where AC supply is not available.

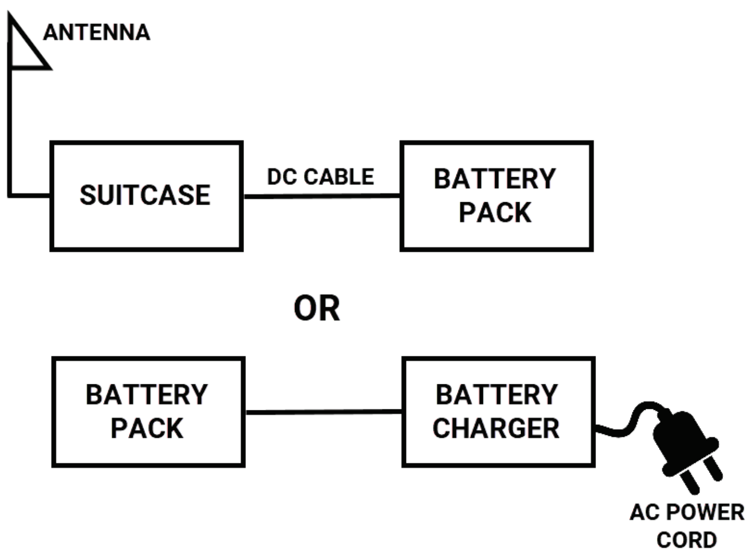
1.2

TRS and Battery Pack Block Diagram

The Battery Pack consists of three components; the main Battery Pack enclosure, a DC output cable (kit number: 7W077X11-01, 7W077X12-01, or 7W088X11-01) and the FutureCharge Battery Charger (kit number: 3P077B01-01).

The following figure shows the Suitcase and Battery Pack block diagram.

Figure 1: Suitcase and Battery Pack Block Diagram



NOTE: For the DVRS Suitcase: It is not recommended to connect the Battery Pack when the DVR-LX Suitcase is powered from AC. A discharged Battery Pack can be damaged. Connecting the Battery Pack and AC at the same time voids the Battery Pack warranty. This limitation does not apply to the PDR8000 and Booster Pack.

1.3
Battery Pack

The main Battery Pack enclosure contains batteries, a battery voltage indicator, and a DC input/output connector.

The DC output connector is connected directly to the batteries without any internal fuses. The internal batteries are used to supply DC power to the Suitcase where AC supply is not available.

The AC to DC battery charger is used to charge the internal batteries from a 120 VAC source.

NOTE: A step-down transformer and an AC plug adapter (if required) are supplied for countries with 220 VAC to 240 VAC mains.

Figure 2: Battery Pack



1.4
DC Input/Output Connector

The battery charger connects to the MIL-C-5015 style 2-contact connector for charging.

The MIL-C-5015 style 2-contact connector is located on the side of the Battery Pack. It supplies power to the Suitcase. The DC cable (kit number: 7W077X11-01 or 7W088X11-01) plugs into this connector. The other end of the DC cable plugs into the Suitcase DC input connector.

Figure 3: DC Input/Output Connector



1.5

Battery Voltage Indicator

A Battery Voltage Indicator is located on the Battery Pack Cover. See indicator on top-right corner of the front of case from Figure 2: Battery Pack on page 13.

The battery voltage indicator is as shown in Table 2: Battery Voltage Indicator on page 14.

Table 2: Battery Voltage Indicator

Indicator	Description
Flashing Red	The battery voltage is less than approximately 10.9 V. **IMPORTANT:** Do not use the Battery Pack when the Battery Voltage Indicator is Flashing RED. Recharge the Battery Pack as soon as possible! Using or leaving the Battery Pack with RED Flashing Battery Voltage Indicator will severely shorten the battery life and is not covered by the Battery Pack warranty!
Flashing Green	The battery voltage is greater than 10.9 V. This is the normal operating range of the Battery Pack.

Chapter 2

Charging Operations

This section contains the charging information of your Battery Pack.

CAUTION:

- Charge the Battery Pack fully before first use!
- The Battery Pack must be charged whenever the Battery Voltage Indicator is Flashing RED!
- The Battery Pack must be charged at room temperature (20°C–25°C)!
- The battery charger must stay connected to the Battery Pack even after the battery is fully charged (float charging). This guarantees that the Battery Pack is fully charged whenever it is needed and that the Battery Voltage Indicator does not discharge the Battery Pack over a period of time.

2.1

Charging Preparation

WARNING:

- Be sure that the area around the Battery Pack and the charger is well ventilated while the Battery Pack is being charged.
- NEVER charge or store the Battery Pack in a warm environment.
- NEVER charge the Battery Pack if it is damaged in any manner or if it has been dropped.
- NEVER charge the Battery Pack if it is damp or wet. Always keep it dry.
- NEVER charge or use the Battery Pack if any terminals located on the DC charging plug or the Battery Pack DC Connector are damaged in any manner or are missing.

Figure 4: Battery Charger



2.2

Charging the Battery Pack

Procedure:

1. Disconnect the DC output cable from the Battery Pack.
2. Plug the DC charger plug into the Battery Pack DC Connector. To lock the DC charger plug to the Battery Pack DC Connector, rotate the locking ring clockwise.
3. Plug the battery charger AC cord into a 120 VAC outlet.

   NOTE: For 220 VAC to 240 VAC outlet, a step-down transformer and an AC plug adapter (if required) is provided.

Result: The charging process is indicated on the battery charger as follows:

Table 3: Charging Indicators

Indicator	Description
Steady Amber	The Battery Pack is charging.
Flashing Green	The Battery Pack is 80% charged.

Indicator	Description
Steady Green	The Battery Pack is fully charged. **NOTE:** The battery charger is in float charge mode. It takes approximately 10 hours for a fully discharged Battery Pack to be charged.
Flashing Amber	The charger is connected to an AC outlet. **NOTE:** If the AMBER light continues to flash, the battery voltage is either too low (less than 3 V) or the DC charger plug is not plugged into the Battery Pack properly. Terminate the charging process immediately if the Battery Pack voltage is below 3 V and contact Motorola Solutions! The most likely cause is either a sulphated battery or a high-resistance connection between the charger and the Battery Pack.

Postrequisites:

- Leave the Battery Pack connected to the battery charger even after it has been fully charged (float charging). Periodically check the Battery Pack during float charging to see if it is unusually warm, if it is releasing an excessive amount of gas, or if it is emitting an unpleasant odor. If any of these things occur, disconnect the charger from the AC electrical outlet and contact Motorola Solutions immediately.
- Do the following ONLY when you need to use the Battery Pack:
  1. Unplug the AC power cord from an AC outlet.
  2. Disconnect the DC charger plug from the Battery Pack DC Connector.
  3. Place the DC connector cover on the Battery Pack DC Connector.
  4. The Battery Pack is ready for use.

Chapter 3

Using the Battery Pack

CAUTION:

- The Battery Pack is NOT waterproof.
- Ensure that the Battery Pack is not submerged into water!
- Discontinue using the Battery Pack whenever the Battery Voltage Indicator is flashing red! Recharge the Battery Pack as soon as possible.
- Use the Battery Pack between ambient temperatures of –15°C and +50°C.

Procedure:

1. Remove the DC connector cover from the Battery Pack DC connector.
2. Connect the Battery Pack DC output cable to the DC output connector.
3. Connect the Battery Pack DC cable to the Suitcase.

Result: The normal Battery Pack operating range is indicated by the GREEN Flashing Indicator on the Battery Pack. See Battery Voltage Indicator on page 14.

Postrequisites: When the Battery Pack is no longer in use, do the following:

- Power down the Suitcase and disconnect the Battery Pack DC cable from the Suitcase.
- Disconnect the Battery Pack DC output cable from the DC output connector.
- Place the DC connector cover on the DC connector.

Chapter 4

Cycle Life

The Battery Pack cycle life is dependent on numerous factors, depth of discharge during each use, charging habits, and ambient temperature.

Providing an exact number to the cycle life versus depth of discharge is impossible, given all variables that may apply. However, in general terms, the following is achieved on a consistent basis:

- For depth of discharge 80% or greater: 100-200 cycles.
- For 50% depth of discharge: 500 cycles.
- For 30% depth of discharge: up to 1000 cycles.

Table 4: Battery Back Up Time

Suitcase Type	Output Power of Suitcase	Back Up Time (At 50:50 Tx-Rx Duty Cycle)
DVR-LX with Low-Power MSU	700: 5 W VHF: 6 W 800/UHF: 10 W	2.5 hours
DVR-LX with Mid-Power MSU	700/UHF/VHF: 5 W 800: 10 W	2 hours
PDR8000	20 W	7.5 hours
Booster Pack	50 W	3.5 hours

Charging Instructions

Option A: For the Longest Cycle Life

The Battery Pack MUST recharge after every use, even if the green light is still flashing. The Battery Pack should be left on the charger permanently until there is a need to use it.

Option B: If the Battery Pack is not left on Charger Permanently

Maintain a monthly charging maintenance schedule. The Battery Pack should be recharged once a month. Every second month, it should be discharged 20% first and then fully recharged.

Chapter 5

Storage

The recommended storage temperature is 25°C (77°F). Do not store the Battery Pack under direct sunlight or in high temperatures exceeding 60°C (140°F).

The Battery Pack will self-discharge during storage. It should be charged at least once a month or preferably left float charging.

IMPORTANT: If the Battery Pack has been stored for a long period in a discharged state (without monthly recharge), it may not be able to regain capacity even if it is recharged. It is recommended to periodically use the Battery Pack and recharge it even if in a stored state. Recharge the Battery Pack at least once a month.

Appendix A

Frequently Asked Questions

How often should I charge the Battery Pack?

The Battery Pack should be placed on charge after every use regardless of the discharge status of the Battery Pack.

NOTE: Failure to charge the Battery Pack after every use, regardless of discharge status, will shorten the life cycle of the Battery Pack.

How long will it take to charge the Battery Pack?

Recharge time is a function of the depth of discharge. A fully discharged new Battery Pack is recharged in about 10 hours.

How long will the Battery Pack power the Suitcase?

The Suitcase back up time depends on many variables: Suitcase Tx-Rx duty ratio, temperature, age of batteries, previous depths of discharge, charging patterns, and others. See Table 4: Battery Back Up Time on page 19.

Can I leave my Battery Pack on charge?

The battery charger is an automatic charger and as long as AC input is provided, it should be left on charge when not in use. However, always periodically monitor the charger and the Battery Pack. Check the Battery Pack to see if it is unusually warm, if it is releasing an excessive amount of gas, or is emitting an unpleasant odor. If any of these things occur, disconnect the charger from the electrical outlet and contact Motorola Solutions immediately.

Appendix B

Battery Pack and Charger Specifications

General Specifications	Value
Back Up Time for Suitcase[1]	
DVR-LX with Low-Power MSU	2.5 hours
DVR-LX with Mid-Power MSU	2 hours
PDR8000	7.5 hours
Booster Pack	3.5 hours
Dimensions Height/Width/Depth	
Battery Pack	245 mm (9.65 in.)/280 mm (11.0 in.)/175 mm (6.9 in.)
Battery Charger	51 mm (2.0 in.)/127 mm (5.0 in.)/124.5 mm (4.9 in.)
Weight	
Battery Pack	13.0 kg (28.5 lb)
Battery Charger	1.8 kg (4.0 lb)
Battery Charger AC Input Voltage	100 VAC–132 VAC, 50 Hz–60 Hz
	200 VAC–240 VAC with Step-Down Transformer
Battery Pack DC Output Voltage Range	10.9 VDC–13.8 VDC
Output DC Cable	
7W077X11-01	TRS Cable
7W077X12-01	Motorola Solutions DC Power Cable
7W088X11-01	PDR8000 DC Cable
Charging Temperature	+20°C to +25°C (+68°F to +77°F)
Operating Temperature	–15°C to +50°C (+5°F to +122°F)
Storage Temperature	+25°C (+77°F)
Charger Compliance	UL 1236 and CSA 22.2
Charger DC Plug Compliance	MIL-C-5015
Connectors	
Battery Pack DC Output	CA3102E16-11SB, “MIL-C-5015” Bayonet
Charger AC Input	NEMA 5-15P Three Prong AC Plug
Charger DC Output	CA3106E16-11PB, “MIL-C-5015” Bayonet
Battery Pack Output Voltage Indicator	
Flashing RED	< 10.9 VDC approximately
Flashing GREEN	> 10.9 VDC approximately

[1] See Table 4: Battery Back Up Time on page 19.

General Specifications	Value
Charger Indicator	
AMBER	Charging
Flashing GREEN	Battery Pack 80% Charged
GREEN	Battery Pack Charged, Float Charging
Flashing AMBER	Error
Charger Features	Short Circuit Protection
	Spark Proof
Charging Time	10 hours approximately
Float Charge	Required